LEAVES FROM THE NOTE-BOOK OF A BELLEVUE NURSE

LECTURE II.—PREVENTION OF DISEASE

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IMMUNITY is the power which exists in some persons to resist certain diseases. It may be either natural or artificial. Fatigue, malnutrition, or any condition which lowers the vitality lessens this resisting power.

There are three theories in regard to the body's defence against disease,—the phagocytes, the humeral, and the antitoxin.

The phagocytes are supposed to destroy or take up invading bacteria and prevent their multiplication, but in so doing they die, the dead leucocytes and bacteria being found in all suppurative matter. Thus the immunity or susceptibility of the body-cells to destroy micro-organisms.

According to the humeral theory, the fixed cells produce a substance called alexin, which destroys bacteria, and immunity is due to the property peculiar to the body-fluids of manufacturing this defensive antibacterial proteid. The phagocytes are supposed to distribute alexin.

ANTITOXIN.

Protoplasm in the human body is constantly changing to urea. One transitional product of this change is leucomain, an alkaline substance which is normally oxidized, but which, if absorbed by the blood, causes leucomainæmia, with its attendant nervous symptoms. The name is applied to the nitrogenous bases or alkaloids developed by the vital changes of living organisms, as distinguished from the alkaloids developed in dead tissue and called ptomaines. These ptomaines are basic in character,—some innoxious, some pathogenic, called toxins. When a bacteria produces toxins quickly and in quantity it is called virulent. Ptomaine poisoning may be from decaying vegetable or animal matter, but always from dead tissue. Poisons may be formed in active vegetable growth, as morphine, digitalis, strychnine, etc., but poisonous ptomaines are always of putrefactive origin. The gradually acquired toleration of certain drugs is not immunity. Antitoxin cannot be manufactured by some people in sufficiently large quantities to repel disease, and it is therefore introduced, as a reënforcement, into the system.

Diphtheria antitoxin is usually cultivated in the horse. Bacilli of Löffler are taken from the throat of a child suffering from diphtheria in

a severe form. In beef bouillon, which is a congenial medium, being animal matter, toxins are formed. After a suitable time this liquid is strained and part of the concentrated solution, two to four centimetres, injected into a horse. When the characteristic diphtheric symptoms which follow have entirely subsided another and larger (twice the quantity) dose is introduced, and the process is repeated until no pathological effects appear. Then blood is taken from the animal, from which the serum containing the antitoxin is separated. To test the efficiency of this, two healthy guinea-pigs are chosen, and into one of them is injected Löffler's bacilli only, into the other the bacilli and serum containing antitoxin.

If the experiment with the horse has been successful and the serum is antitoxin, the effect of the bacilli will be counteracted and the second guinea-pig will live, while the first dies with marked symptoms of diphtheria. The injection of antitoxin produces artificial immunity. Immunity may be either artificial or natural, congenital or acquired. Hygienic surroundings and habits aid materially in the repulsion of disease.

A *disinfectant* is any drug that destroys micro-organisms of contagious diseases. When bacteria are rendered impotent they are said to be sterilized. Disinfectants for the sake of convenience are divided into two principal classes—viz., Physical Agents and Chemical Agents.

Physical Agents.

(1) Heat (dry or moist); (2) Cold; (3) Light; (4) Electricity.

Chemical Agents.

(1) Acid—mineral acid, sulphuric acid; (2) Alkalies—lime, quicklime, chlorides; (3) Metallic Salts; (4) Coal-Tar Products—carbolic, creolin; (5) Miscellaneous—formaldehyde, etc.

Heat may be dry or moist; 140° F. will kill all except spore-forming bacteria. These must be boiled at 212° F. for thirty minutes, or subjected to steam at a temperature of 230°. Most bacteria are destructible at the freezing-point, typhoid and tubercular germs being exceptions. Yellow-fever bacteria are killed by mere frost. Sunlight is a good disinfectant.

Ventilation means exposure to wind, light, and air, which are essential to a patient, though a draught should never strike him. An ordinary temperature for the sick-room is 65° F., special diseases needing special variations, pulmonary affections requiring about 70° F. Children and old people should have an even temperature of 72° F.

A tallow candle is the best means of lighting a patient's room, as it consumes one-half as much oxygen and gives off one-half as much car-

bonic acid gas as a human being, while a lamp or gas-jet requires five times as much.

Hydrochloric acid and nitric acid are good preventative disinfectants, useful for children in summer complaints.

Among the most valuable of the metallic salts is bichloride of mercury, 1 to 10,000; it will not kill spore-forming bacteria, but it corrodes metals, stains linen, is poisonous, and if the object to be disinfected contains albumin, it forms an insoluble albuminate which encloses bacteria, and when the matter is thrown out the germs are liberated. This last difficulty may be obviated by adding to the bichloride solution salt or hydrochloric acid. Bichloride is decomposed by sulphuretted hydrogen or alkalies.

The chief coal-tar products are carbolic acid, creolin, and lysol. Carbolic acid in a strength of 1 to 20 kills all spores except typhoid, for which chloride of lime is the best. Carbolic does not corrode, is not influenced or decomposed like bichloride, but it is dangerously poisonous even in dilute solutions. Creolin should always be freshly made. It is mostly used in a strength of 1 to 100. Lysol in a one per cent. or two per cent. solution is a pleasant soapy disinfectant for the hands. Formaldehyde gas is a good disinfectant, formed by wood alcohol. The gas should be in the water in the strength of forty per cent.; three pints will disinfect one thousand cubic feet of air, and although not poisonous to inhale, it may be generated outside and introduced through a keyhole into a sealed room for six hours.

An *antiseptic* is any substance that destroys germs which produce sepsis or putrefaction. Peroxide of hydrogen and thymol are excellent antiseptics, though not disinfectants. *Aseptic,* without germs, as boiled water. Asepsis and antisepsis was introduced by Lord Lister, a Scotch doctor, who reduced the death-rate of operative cases (from 1864 to 1869) from forty-five per cent. to three-tenths of one per cent.

DEODORANTS.

Bacteria acting on proteids produce offensive gases. These may be deodorized by chloride or bromine. The latter is irritating to the respiratory tract and the bottle should be opened under water (one ounce bromide to three gallons of water). Stir well and sprinkle about the room.

Sulphate of iron and chloride of zinc are both good deodorants, and also act as disinfectants. Permanganate of potash is also a deodorant and antiseptic.

(To be continued.)